Original Article

Frequency of ABO and Rh Blood Groups in Middle School Students of Yazd Province

Ghasemi N[1], Ayatollahi J[2], Zadehrahmani M[3], Nasiri A[4], Abedi A[4], Shokraneh S[4], Tahmasebi M[4]

1- Research and Clinical Centre for Infertility, Yazd Shahid Sadoughi Medical Sciences University, Yazd, Iran
2- Yazd Shahid Sadoughi Hospital, Yazd Shahid Sadoughi Medical Sciences University, Yazd, Iran
3- Yazd governorship Research and Training office
4- General Practitioner, Yazd Shahid Sadoughi Medical Sciences University, Yazd, Iran

Abstract

Objective

The history of the studies on blood groups dates back to early 20th century. More than 600 antigenic structures were detected among 29 blood groups. However, ABO and Rh antigenic structures were taken into consideration in transfusion medicine. Frequency of the blood groups in a community helps the individuals in need and blood bank employees, which could be related to some disorders.

Methods

This study aimed to find out the frequency of ABO and Rh blood groups in middle school students of Yazd province, which was done by evaluation of 2000 students between September 2006 and March 2007. Blood groups were examined by slide test method. Place and date of birth were answered by parents.

Results

The frequency of the blood groups B, O, A, AB were found in order as 30.6%, 30.4%, 27%, 12% respectively. Chi square test showed that is no significant relationship between ABO blood groups and sex, place of birth and insemination season.

Conclusion

This study confirmed that ABO and Rh antigenic structure differs between regions and nations.

Keywords:

ABO and Rh blood groups, antigens, Yazd province

Corresponding Author:

Ghasemi N PhD. Research and Clinical Centre for Infertility, Yazd Shahid Sadoughi Medical Sciences University, Yazd, Iran Email: n479g@yahoo.co.uk

Introduction

The ABO and Rh blood groups are the most important among 29 blood groups (1). The history of the studies on blood groups dates back to early 20th century. In 1900, Landsiteiner described the blood groups A, B, O and the presence of Rhesus system was recognized in 1939 by him (2, 3).

The regulation of ABO blood group system is under the control of ABO gene expression (4). These genes located on the long arm of the autosomal locus at chromosome number 9, which constitute the four blood types. The gene symbols A, B, AB and I are often used to denote these alleles. Two alleles, R and r, are responsible for the inheritance of rhesus blood groups, with R

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denoting Rh positive, and r being Rh negative allele. Gene frequency takes into consideration the numbers of various genotypes in the population, and the relative allele frequencies are determined by application of the Hardy-Weinberg Law. In the coming years, O was found more suitable in defining blood and the blood groups were named as A, B, O, AB (1, 5, 6).

More than 600 antigenic structures were detected among 29 blood groups. However, ABO and Rh antigenic structure were most important in transfusion medicine (2). For other blood groups, clinical problems rarely occur and only when a problem occurs, they are examined (7). ABO and Rh antigenic structure differs between regions and nations (8, 9).

There is some study in Iran on blood groups frequency. However, there is only one study on blood groups in Yazd that has carried out by blood transfusion organization (10). To know the rates of the blood groups in a community really helps the citizens in need and blood bank employees taking blood and its products and keeping them. In addition, research on ABO group system has been of great interest, due to its medical importance in different diseases, which the genetic history of a person could be known by studying the blood groups (11). This study aimed to find out the frequency of ABO and Rh blood groups in middle school students and provide new frequency for further research in genetic fields.

Material and method

This cross-sectional study was done by evaluation of 2000 children, who were student of middle schools of Yazd province from September 2006 till September 2007. From 32 middle school 10 were chosen randomly. Two thousands student were chosen randomly from these 10 schools, which 5 were for boys (1000 students) and 5 were for girls (1000 students).

Blood drop was taken by needle bite on index finger. For the ABO and Rh tests, a drop of blood was placed on clean slides. A drop of each of the antisera, anti A, anti B and anti D (from Blood Research and Fractionation Co) was added and mixed with each blood sample. Blood groups were determined on the basis of agglutination.

The questionnaire was filled by the parents of children after they signed informed consent. It contained demographic information, included date and place of birth.

Results

The frequency of the blood groups B, O, A, AB were 30.6%, 30.4%, 27%, 12% respectively. The frequency was not significantly different between boys and girls (table 1). The frequency of Rh blood groups 85.9% and 14.1% positive and negative respectively. The frequency was not significantly different between boys and girls, but fortunately positive Rh was more frequent in girls (table 2). There is no significant relationship between ABO and RH blood groups and place of birth and insemination season. Insemination season were confirmed by parents by the date of birth.

Table 1. Frequency of ABO blood groups in cases according to their sex

Sex	Girls		Boys		Sum	
Blood groups	No	Per	No	Per	No	Per
A	264	26.4	275	27.5	539	27
B	312	31.2	299	29.9	611	30.6
O	287	28.4	320	32	607	30.4
AB	137	13.7	106	10.6	243	12
Sum	1000	100	1000	100	2000	100

Blood group B is most frequent blood type which followed closely by blood group O.

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Table 2. Frequency of Rh blood group in cases according to their sex

Sex / Rh	Girls		Boys		Sum	
	No	Per	No	Per	No	Per
Positive	873	87.3	845	84.5	1718	85.9
Negative	127	12.7	155	15.5	282	14.1
sum	1000	100	1000	100	2000	100

Rh positive was the most common types in boys and girls.

Discussion

Blood groups antigens are hereditary, which ABO alleles are on the 9th chromosome. Antigens of ABO and Rh system are placing on the surface of erythrocyte and other cells as membrane antigens, which dissolved in urine, feces, milk, saliva and plasma. In addition, serum has strong antibodies against antigens, which are not placing on the surface of erythrocyte (12, 13).

ABO system is the most important antigenic system in transfusion and tissue transfer. Blood groups differ regionally and ethnically (8, 9). A, O, B, AB blood groups are identified in order, 37.1%,46.7%, 12.2%, 4.1% in USA; 41.8%, 46.6%, 8.6%, 3% in England; 48.2%, 34.2%, 12%, 5.5% in Greece; 39.9%, 35.8%, 16.8%, 7.6% in Bulgaria; 42%, 35.4%, 14.4%, 8.1% in Lebanon; and 42.8%, 32.7%, 16.5%, 8% in turkey (14, 15). The frequency of various ABO and RH blood groups among male and female subjects were recorded in Pakistan as 27.01% and 24.02% (for blood group A), 33.75% and 32.87% (for blood group B), 8.93% and 11.20% (for blood group AB) and 30.31% and 31.91% (for blood group O) and Rh positive and negative distribution in the studied population was 92.45% and 7.55% respectively (16). The rates of blood groups A, O, B and AB in Iran are identified in order as 30.25%, 37.62%, 24.36% and 7.77% respectively, which were 33.77%, 26.57%, 3081%, 8.85% in blood groups O, A, B, AB respectively in Yazd (10). These results are more than 2% different with the result of present study. The Rh blood group frequency was different, which changed from 89.9% Rh-D (positive) and 10.08% Rh-d (negative) to 85.9% and 14.1% respectively in present study.

One study in Greece found the frequency of distribution of the ABO and Rh blood groups was slightly made different in comparison to previous relevant studies. Significant increase was recorded with respect to the emergence of blood group B in the population investigated, and a considerable reduction was noted in blood group O (10).

In present study, there was no significant relationship between sex and ABO and Rh blood groups, which was confirmed by study was done in Pakistan (17).

Present study was found that in native people (ones who was originally from Yazd), B blood group had the highest frequency (30.5%) while in other people (ones who was originally from other provinces), B and O blood groups had the highest frequency. However, chi square test showed that is no significant relationship between ABO blood groups and origin. This is confirmed that ABO and Rh antigenic structure differs between regions and nations (18).

This study determined the relationship between ABO blood groups and insemination season. The most frequency of ABO blood groups in spring season was A blood group (27.8%), and O was higher in summer and fall seasons (28.7%) but in winter, the most frequency was related to AB (29.2%). However, chi square test showed that is no significant relationship between ABO blood groups and insemination season. These results were confirmed by other study (19), but

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others suggests there is relation between the ABO and Rh blood groups distribution and the insemination seasons (20).

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